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EXAMINER	
SETH, MANAV	
ART UNIT	**PAPER NUMBER**
2625	

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/023,787	FARMER, MICHAEL EDWARD	
	Examiner	Art Unit	
	Manav Seth	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _03 January 2006_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1,3-13,15,16 and 20-42_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _18 and 19_ is/are allowed.

6)☒ Claim(s) _1,3-13,20-33,37-43_ is/are rejected.

7)☒ Claim(s) _15,16,34-36 and 44-46_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed January 3, 2006 has been entered in full.

2. Applicant's amendments to the claims have been fully considered, but are moot in view of the new ground(s) of rejection. The amendment to the claims changed the scope of the claims, and therefore this action is made final.

Claim Objections

3. Claim 3 and 4 is objected to because of the following informalities:

The claims submitted on 9/15/2005 recited claims 3 and 4 depending on claim 1. However, the claims submitted with the current amendment recites claim 3 depending on itself and claim 4 depending on claim 3 and the status of the claims show "previously presented". Examiner assumed both claims 3 and 4 depending on claim 1 for rejection purposes. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-4, 6-13, 20-33 and 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baxes, Book Publication, 1994, "Digital image processing: principles and application", further in view of Yokoyama, U.S. Patent No. 5,715,006, and further in view of Ishikawa et al., U.S. Patent No. 4,625,329.

Regarding claim 1, Baxes teaches that the image segmentation process consists of three stages (i) **image preprocessing**, where the image is visually improved to make it as free of zero-information-carrying clutter as possible, (ii) **initial object discrimination**, where objects are grossly separated into groups with similar attributes, and (iii) **object boundary cleanup** which includes image morphological processing, where object boundaries are reduced to single-pixel widths and removes noise clutter and other artifacts from the image (page 124, para. 2, figure 5.1). Baxes further discloses that an image exists as a large array of pixels with associated brightness (characteristic) (page 123, para. 2, line 1). It is clear from this disclosure by Baxes that image to be segmented consists of a plurality of pixels and each pixel inherently has a value (initial value) associated with it to measure the characteristics associated which conforms to the limitation **"receiving an ambient image represented by a plurality of pixels and plurality of initial pixel values, wherein each said pixel has at least one said initial pixel value"**.

Baxes teaches the second stage (initial object discrimination) of the image segmentation process, which uses **binary contrast enhancement** operation to isolate objects in the image, by highlighting similar objects with a common brightness (page 126, para. 3). Baxes further discloses binary contrast enhancement consists of comparing each pixel (initial) value to the threshold value to identify whether pixel belongs to darker (background) area or the brighter (foreground or object) area where darker and brighter areas are two pixel categories (page 330) which conforms to the

limitation **"identifying one or more pixels as belonging to one of a plurality of pixel categories on the basis of one or more initial pixel values associated with the pixels being identified".**

Baxes further teaches binary contrast enhancement process consists the comparing of pixel brightness (initial) value to the brightness threshold value where if the pixel brightness is darker than the threshold, the resulting pixel brightness is set to 0 (first revised pixel value) and if the pixel brightness is brighter than the threshold, the resulting brightness is set to 255 (first revised pixel value) (page 330, para 1). **Baxes further discloses determining (generating) an image threshold (page 77, para. 2, lines 3-5 reciting "the adaptive threshold value is usually determined by computing the average brightness in the area......").** It is clear from this disclosure that each pixel in the brighter area will have a value of 255 and each pixel in the darker area will have a value of 0 which conforms to the limitation **"establishing a first revised pixel value for one or more pixels, wherein each pixel in the same pixel category has the same first revised pixel value".**

Baxes teaches the third stage **(object boundary cleanup)** of the image segmentation process, which uses a binary morphological processes (operations) such as erosion and dilation (opening and closing), to operate upon binary images, such as those created using a binary contrast enhancement operation (page127, para. 2; page 128, para. 4 and 5). Baxes further teaches of comparing every pixel in the image with its 8 neighbors to produce a resulting output pixel value (second revised pixel value) (page 128, last para.). Baxes further teaches "In case where all nine input pixels are identical to their respective mask values, the resulting pixel value is set to a predefined logical value (either 0 or 1). Where one or more input pixels do not match their respective mask values, the resulting value is set to the opposite state (revised second pixel value) (page 129, para.1) which conforms to the limitation **"setting a second revised pixel value for one or more of said**

pixels on the basis of one or more first revised pixel values that are associated with one or more pixels in the vicinity of the pixel being set".

Baxes as discussed above performs image segmentation using three stages where 2nd stage **(initial object discrimination)** establishes the first revised value of the pixels and 3rd stage **(object boundary cleanup)** establishes the second revised value of the pixels where Baxes establishes second revised value of the pixels using morphological heuristic. However, the amended claim 1 recites the additional limitation "wherein setting the second revised pixel value includes a momentum-based heuristic". As discussed before, Baxes establishes second revised value of the pixels using morphological heuristic in the third stage (object boundary cleanup), where **object boundary cleanup** which includes image morphological processing, where object boundaries are reduced to **single-pixel widths and removes noise clutter** and other artifacts from the image (page 124, para. 2, figure 5.1), but does not teach object boundary cleanup using a **momentum-(motion) based heuristic**. Based on examiner's additional search, examiner finds the reference Yokoyama. Yokoyama discloses motion-compensated segmentation which uses momentum (motion)-based heuristic for boundary cleanup by disclosing "The information at the displaced pixel position includes information of a pixel position for which estimated value is missing in the initial predicted image, and the estimated value at a pixel position for which estimated value is missing (gap), is favorably decided according to motion information of several areas in the proximity of the displaced pixel position" (col. 2, lines 41-48) and further emphasizing on figures 3A-E. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made to use Yokoyama's teachings of using momentum-based heuristic to establish the second revised pixel value in the invention of Baxes because momentum based heuristic would provide motion

compensated segmented image while keeping the boundary of the overall area and thereby to minimize distortion of area boundary portions (See Yokoyama, col. 7, lines 65-68, col. 8, lines 1-3).

The whole disclosure by Baxes in view of Yokoyama, discussed above would conform to the limitation **"deriving a segmented image of the occupant (object) from said first revised pixel value and said second revised pixel value"**.

Baxes further discloses "the mission of image analysis operations (such as image segmentation) is to understand an image by quantifying its elements. The elements of interest are generally objects in an image, such as cells, bolts, aircraft, or characters on a page of text, which are occupant of the image. Image analysis operations play a major role in **automated machine vision and image interpretation applications** of digital image processing" (page 123, para. 1). It is clear form above disclosure that image processing operations as disclosed by Baxes can be used in any image processing field where image segmentation is required to identify the object (occupant) in the image and this is further supported by Ishikawa. Ishikawa discloses of a similar image segmentation method and system, which includes an image sensor for generating sensor measurements to identify the occupant in the vehicle (figures 8, 10A and 10B; col. 1, lines 56-60; col. 2, lines 28-32 and lines 45-46; col.5, lines 15-50).

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention was made to use combined Baxes's and Yokoyama's teachings in the machine vision and image interpretation applications related to image processing such as disclosed in Ishikawa's invention.

Claim 3 recites "an image segmentation method as in claim 1, wherein identifying one or more said pixels further includes comparing said plurality of initial pixel values to said image threshold". Claim 3 has been similarly analyzed and rejected as per the rejection of claim 1.

Claim 4 recites "an image segmentation method as in claim 1, wherein generating an image threshold further comprises analyzing the distribution of initial pixel values relating to a pixel characteristic". Baxer discloses determining the threshold by computing the average brightness in the area (page 77, lines 3-4; page 153, para. 3) and further teaches that brightness and color features (pixel characteristics) of an object can be extracted by examining every pixel within the object's boundaries and discloses that this can be done using a histogram, where histogram shows the brightness (pixel characteristic) distribution found in the object (page 153, para. 2 and 3).

Claim 6 recites "an image segmentation method as in claim 4, wherein each pixel has only one initial pixel value and only one pixel characteristic". Baxes as discussed in the rejection of claim 4, uses a histogram where histogram provides the characteristic (brightness) associated with each pixel, it is clear from this that in histogram graph (page 63, figure 3.19b) each pixel will have one value for each characteristic (sharpness) associated with it.

Claim 7 recites "an image segmentation method as in claim 6, wherein luminosity is said pixel characteristic". Luminosity is the synonym of Brightness as the characteristic of the pixel. Claim 7 has been similarly analyzed and rejected as per claims 6, 4 and 1.

Claim 8 recites "an image segmentation method as in claim 3, wherein each said pixel has a pixel location with respect to the ambient image, and said pixel location determines which of a plurality of image thresholds are compared to said initial pixel value for said pixel in said pixel location". As disclosed in the rejection of claim 1, Baxes teaches that an image exists as a large array of pixels with associated brightness (characteristic) (page 123, para. 2, line 1). It is clear from this disclosure by Baxes that image is made of plurality of pixels and each pixel has to have a any pixel location to represent the image and the position of the pixel can further be determined using histogram which shows the distribution of image pixels. Baxes further discloses in the rejection of claim 1, that for image segmentation the initial pixel value of the pixel is compared to the image threshold generated. **Baxes further teaches adaptive thresholding in which the appropriate threshold value may need to change throughout the image being processed depending on the qualities of the image in the area being processed, for example, "in areas where the image is darker, the threshold value decrease and in areas where the image is lighter (brighter), the threshold value increases" (page 76, para. 1).** It is clear from the above disclosure by Baxes, adaptive thresholding can be used to determine a plurality of image thresholds depending on the pixel location, to which the each said pixel can be compared to, **which conforms to the limitation "said pixel location determines which of a plurality of image thresholds are compared to said initial pixel value for said pixel in said pixel location".**

Claim 9 recites "an image segmentation method as in claim 8, wherein a higher image threshold is applied in pixel locations where there is brighter lighting". Claim 9 has been similarly analyzed and rejected as per claim 8.

Claim 10 recites "an image segmentation method as in claim 1, wherein there are only two pixel categories". As disclosed by Baxes in the rejection of claim 1, The pixel is either identified as belonging to darker area or brighter area where darker and brighter areas are two pixel categories. Claim 10 has been similarly analyzed and rejected as per claim 1.

Claim 11 recites "an image segmentation method as claim 1, wherein setting the second revised pixel value includes a morphological heuristic". As disclosed by Baxes in rejection of claim 1, the third stage (object boundary cleanup) of the image segmentation process, which uses a binary morphological processes (heuristic) such as erosion and dilation, to operate upon binary images, such as those created using a binary contrast enhancement operation (page127, para. 2; page 128, para. 4 and 5) and Baxes further teaches of comparing every pixel in the image with its 8 neighbors to produce a resulting output pixel value (second revised pixel value) (page 128, last para.). Claim 11 has been similarly analyzed and rejected as per claim 1.

Claim 12 recites "an image segmentation method as in claim 11, wherein the morphological heuristic is a morphological erosion". Claim 12 has been similarly analyzed and rejected as per claim 11 and claim 1.

Claim 13 recites "an image segmentation method as in claim 12, wherein the morphological heuristic is a morphological dilation". Claim 13 has been similarly analyzed and rejected as per claims 12, 11 and 1.

Claim 20 recites an image segmentation system, which comprises of an image thresholding subsystem and a gap processing subsystem. As discussed in the rejection of claim 1, Baxes discloses image segmentation, which comprises of three stages where second stage provides the image thresholding and third stage uses dilation and erosion (closing and opening) for a gap processing (page 136, para. 5, lines 2-3). To perform these image segmentation operations, a system is obviously required. Ishikawa presents a image processing system for image segmentation as discussed in claim 1.

Claim 21 has been similarly analyzed and rejected as per claims 20, 1, 4, 6 and 7.

Claim 22 has been similarly analyzed and rejected as per claims 21, 20, 1, 4, 6, and 7.

Claim 23 has been similarly analyzed and rejected as per claims 22 → 20 and 5.

Claim 24 has been similarly analyzed and rejected as per claims 23 → 20 and 5.

Claim 25 has been similarly analyzed and rejected as per claims 24 → 20 and 8.

Claim 26 recites two subsets of pixels similarly like two categories (darker area and brighter area which contain dark and white pixels) as in rejection of claim 1. Claim 26 has been similarly analyzed and rejected as per claims 24 → 20 and claim 1.

Claim 27 has been similarly analyzed and rejected as per claims 26 → 20 and claim 1.

Claim 28 recites "an image segmentation system as in claim 27 wherein at least approximately half of said plurality of said pixels are set to said first binary value". Setting the plurality of said pixels to said first binary value depends on the size of the object to be segmented and the on the area of the background, if the area of the object is half the image, then it is clear that almost half the pixels in the image will be set to binary value to be labeled to the object and rest to the background.

Claim 29-31 have been similarly analyzed and rejected as claims 20, 1 and 11-13.

Claim 32 recites "an image segmentation as in claim 29, said morphological heuristic comprising a vertically-based morphological heuristic". Baxes further discloses that morphological erosion and dilation operations can b performed in vertical and horizontal directions (page 136, para. 1, line 3).

Claim 33 recites "an image segmentation as in claim 29, said morphological heuristic comprising a horizontally-based morphological heuristic". Claim 33 has been similarly analyzed and rejected as per claim 32.

Claims 39-42 recites the use of different thresholds in different areas of the image thus providing an adaptive thresholding and it is well known to be used in the art of image processing and further emphasis has been added in the arguments as disclosed in the rejection of claim 8 which shows "Baxes teaches adaptive thresholding in which the appropriate threshold value may need to

change throughout the image being processed depending on the qualities of the image in the area being processed, for example, "in areas where the image is darker, the threshold value decrease and in areas where the image is lighter (brighter), the threshold value increases" (page 76, para. 1). Therefore claims 39-42 has been similarly analyzed and rejected as per claim 8.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baxes, Book Publication, 1994, "Digital image processing: principles and application", Yokoyama, U.S. Patent No. 5,715,006, and further in view of Ishikawa et al., U.S. Patent No. 4,625,329 and further in view of Google article, Jan. 29, 2001, "Point operations", and further in view of Hentea, IEEE Publication, 1993, "Algorithm for automatic threshold determination for image segmentation".

Claim 5 recites "an image segmentation method as in claim wherein analyzing the distribution of initial pixel values further includes: recording aggregate initial pixel values into a histogram; translating the histogram into a cumulative distribution function". As disclosed in the rejection of claims 1 and 4, Baxes discloses the use of histogram to generate the image threshold by recording the initial pixel values of the image in the histogram. Baxes does not teach of translating the histogram into a cumulative distribution function and calculating an image threshold based on the predetermined percentage of initial pixel values falling below the image threshold and neither does Ishikawa teaches the same. It is well known in the art of image processing that thresholding in its various versions (local, global, and dynamic), is the most commonly used method for image segmentation and global thresholding produces satisfactory results if the input images are corrected for uneven illuminant (shading correction). Translating the histogram into a cumulative distribution function is nothing but histogram equalization and histogram equalization is well known in the art of

image processing and is further supported by Google article "Point operations". This article on page 2 of 4, discloses histogram equalization by obtaining the cumulative probability distribution of r (where r is an input value). Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made, to use the teachings of "Point operations" of obtaining the cumulative probability distribution of the histogram in the combined invention of Baxes, Yokoyama, and Ishikawa. One would have been motivated to use the teachings of "Point operations" of obtaining the cumulative probability distribution of the histogram in the combined invention of Baxes, Yokoyama and Ishikawa because both the all the reference are directed to image processing field and "Point operations" performs histogram equalization by obtaining the cumulative probability distribution of the histogram **to distribute the gray levels of the image evenly over the maximum possible range (page 2 of 4)**.

Claim 5 further recites the limitation "calculating an image threshold based on a predetermined percentage of initial pixel values falling below the image threshold". Baxes does teach of determining image threshold based on the calculation performed on the initial pixel values but calculating an image threshold based on the predetermined percentage of initial pixel values falling below the image threshold and neither does Ishikawa and "Point operations" teaches the same. However, Hentea discloses an algorithm for automatic threshold selection for the detection of objects that are darker than the background (page 535, right col., para. 2). Hentea further provides the teachings where a cumulative histogram is calculated from the pixel values and then the image threshold is automatically selected as the gray level for which a given percentage of the blocks (or plurality of pixel values) have minimum values lower than it (image threshold) (page 535, right col., para. 4).

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention was made to use the teachings of Hentea in the combined invention of Baxes, Yokoyama, Ishikawa and "Point operations". One would have been motivated to use the teachings of Hentea in the combined invention of Baxes, Yokoyama, Ishikawa and "Point operations" because Hentea belongs to the same art of endeavor (image segmentation) as are Baxes, Yokoyama, and Ishikawa and Hentea further provides the teachings for the automatic selection of the threshold for global thresholding which is very robust and performs well for images belonging to a large class and is also very efficient from a computation point of view, and is very flexible (page 538, right col., para. 1).

7. Claims 37, 38 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baxes, Book Publication, 1994, "Digital image processing: principles and application", further in view of Yokoyama, U.S. Patent No. 5,715,006, and further in view of Ishikawa et al., U.S. Patent No. 4,625,329 and further in view of Katto, U.S. Patent No. 5,917,936.

Regarding claim 43, Baxes teaches that the image segmentation process consists of three stages (i) **image preprocessing**, where the image is visually improved to make it as free of zero-information-carrying clutter as possible, (ii) **initial object discrimination**, where objects are grossly separated into groups with similar attributes, and (iii) **object boundary cleanup** which includes image morphological processing, where object boundaries are reduced to single-pixel widths and removes noise clutter and other artifacts from the image (page 124, para. 2, figure 5.1). Baxes further discloses that an image exists as a large array of pixels with associated brightness (characteristic) (page 123, para. 2, line 1). It is clear from this disclosure by Baxes that image to be segmented consists of a plurality of pixels and each pixel inherently has a value (initial value) associated with it to measure the characteristics associated which conforms to the limitation **"receiving an ambient**

image represented by a plurality of pixels and plurality of initial pixel values, wherein each said pixel has at least one said initial pixel value".

Baxes teaches the second stage (initial object discrimination) of the image segmentation process, which uses **binary contrast enhancement** operation to isolate objects in the image, by highlighting similar objects with a common brightness (page 126, para. 3). Baxes further discloses binary contrast enhancement consists of comparing each pixel (initial) value to the threshold value to identify whether pixel belongs to darker (background) area or the brighter (foreground or object) area where darker and brighter areas are two pixel categories (page 330) which conforms to the limitation **"identifying one or more pixels as belonging to one of a plurality of pixel categories on the basis of one or more initial pixel values associated with the pixels being identified".**

Baxes further teaches binary contrast enhancement process consists the comparing of pixel brightness (initial) value to the brightness threshold value where if the pixel brightness is darker than the threshold, the resulting pixel brightness is set to 0 (first revised pixel value) and if the pixel brightness is brighter than the threshold, the resulting brightness is set to 255 (first revised pixel value) (page 330, para 1). **Baxes further discloses determining (generating) an image threshold (page 77, para. 2, lines 3-5 reciting "the adaptive threshold value is usually determined by computing the average brightness in the area......").** It is clear from this disclosure that each pixel in the brighter area will have a value of 255 and each pixel in the darker area will have a value of 0 which conforms to the limitation **"establishing a first revised pixel value for one or more pixels, wherein each pixel in the same pixel category has the same first revised pixel value".**

Baxes teaches the third stage **(object boundary cleanup)** of the image segmentation process, which uses a binary morphological processes (operations) such as erosion and dilation

(opening and closing), to operate upon binary images, such as those created using a binary contrast enhancement operation (page127, para. 2; page 128, para. 4 and 5). Baxes further teaches of comparing every pixel in the image with its 8 neighbors to produce a resulting output pixel value (second revised pixel value) (page 128, last para.). Baxes further teaches "In case where all nine input pixels are identical to their respective mask values, the resulting pixel value is set to a predefined logical value (either 0 or 1). Where one or more input pixels do not match their respective mask values, the resulting value is set to the opposite state (revised second pixel value) (page 129, para.1) which conforms to the limitation **"setting a second revised pixel value for one or more of said pixels on the basis of one or more first revised pixel values that are associated with one or more pixels in the vicinity of the pixel being set"**.

Baxes as discussed above performs image segmentation using three stages where 2nd stage **(initial object discrimination)** establishes the first revised value of the pixels and 3rd stage **(object boundary cleanup)** establishes the second revised value of the pixels where Baxes establishes second revised value of the pixels using morphological heuristic. However, the amended claim 1 recites the additional limitation "wherein setting the second revised pixel value includes at least one of a momentum-based heuristic and a gravity-based". As discussed before, Baxes establishes second revised value of the pixels using morphological heuristic in the third stage (object boundary cleanup), where **object boundary cleanup** which includes image morphological processing, where object boundaries are reduced to **single-pixel widths and removes noise clutter** and other artifacts from the image (page 124, para. 2, figure 5.1), but does not teach object boundary cleanup using a **gravity-based heutristic and neither does Yokoyama and Ishikawa teach it**. Based on examiner's additional search, examiner finds the reference Katto. Katto discloses gravity-based heuristic used in image segmentation (col. 1, lines 9-40) by disclosing "This proposed clustering

technique takes into account the five-dimensional space including the tristimulus values R, G and B as a feature amount space and a pixel position (x, y). Here, assume that a color information of an **attentive pixel** is (R, G, B), a position information for the attentive pixel is (x, y), ...and a positional **gravity** of the cluster at the index ....Furthermore, the distance d_n is calculated for a plurality of clusters in the neighborhood of the attentive pixel, and it is concluded that the attentive pixel belongs to the cluster "n" having a minimum distance d_n", thus assigning the revised value to the pixel belonging to the cluster having a minimum distance. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made to use Katto teachings of using Gravity-based heuristic to establish the second revised pixel value in the combined invention of Baxes, Yokoyama and Ishikawa because gravity based heuristic would provide region based segmentation approach without losing local information and is robust when presented with noisy input and is not sensitive to edge definition (See Katto, col. 1, lines 38-41).

Claims 37 and 38 have been similarly analyzed and rejected as per the claim 43. Emphasis is made on the disclosure provided by Katto.

Allowable Subject Matter

Reasons for Allowance:

8. Claims 18 and 19 are allowed.

The following is an examiner's statement of **reasons of allowance**:

Both the instant invention and the closest prior art Baxes, Book Publication, 1994, "Digital image processing: principles and application" are directed to a method of image

segmentation to identify objects (occupants) in the images. The instant invention further recites the limitations "determining a third revised pixel value from said second revised pixel value or said first revised pixel value with a momentum-based heuristic; identifying regions of pixels based on the first revised pixel value, the second revised pixel value, and the third revised pixel value" in claim 18 whereas Baxes and other prior art of record does not teach use of momentum-based operations or heuristic to identify regions of pixels based on the first revised pixel value, the second revised pixel value, and the third revised pixel value and so on. Therefore claim 18 is allowed. Claim 19 is dependent on claim 18 and therefore is allowed.

9. Claims 15-16, 34-36, and 44-46 are objected to as being dependent upon a rejected base, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (571) 272-7456. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Manav Seth
Art Unit 2625
February 16, 2005

BHAVESH M. MEHTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600